Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Parts 2 and 87 of the	)	
Commission's Rules Regarding the	)	ET Docket No. 98-197
Radionavigation Service at 31.8-32.3 GHz	)	

REPORT AND ORDER

Adopted: September 22, 2000 **Released:** September 26, 2000

By the Commission:

I. INTRODUCTION

1. By this action, we amend Part 2 of the Commission's Rules to delete the unused radionavigation[1] service allocation from the sub-band 31.8-32.3 GHz[2] in the Non-Federal Government Table of Frequency Allocations.[3] Consequently, we also amend Part 87 to remove this sub-band from the list of available frequencies set forth in the rules for the Aviation Services. We take this action in response to a request from the National Telecommunications and Information Administration ("NTIA").[4] This action will obviate concerns for interference to the reception of deep space[5] radiocommunications in the band 31.8-32.3 GHz from co-channel, non-Federal Government radionavigation transmissions that could otherwise occur in the future. This action will also provide adequate spectrum for future applications of the non-Federal Government radionavigation service in the remaining 1.1 gigahertz at 32.3-33.4 GHz.

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[1] Radionavigation is defined as radiodetermination used for the purpose of navigation, including obstruction warning. Radiodetermination, in turn, is the determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters, by means of the propagation properties of radio waves. *See* 47 C.F.R. § 2.1.

[2] Currently, the band 31.8-33.4 GHz is allocated to the radionavigation service on a primary basis in both the Federal and Non-Federal Government Table of Frequency Allocations.

[3] 47 C.F.R. § 2.106. In addition, we move the primary space research service (deep space) (space-to-Earth) allocation in the band 31.8-32.3 GHz that is currently found in footnote US262 up into the Table as a direct listing. We make this non-substantive revision in order to parallel the International Telecommunication Union's [International] Table of Frequency Allocations.

[4] *See* Letter to Chief, Office of Engineering and Technology, from the Associate Administrator, Office of Spectrum Management, NTIA, dated November 3, 1997. The Commission, which is an independent agency, administers non-Federal Government spectrum and the NTIA, which is an operating unit of the Department of Commerce, administers Federal Government spectrum. *See* 47 C.F.R. § 2.105(a).

[5] Deep space is defined as space at distances from the Earth equal to, or greater than, two million kilometers (1,242.742 miles). *See* 47 C.F.R. § 2.1.

II. BACKGROUND

2. In the International Table of Frequency Allocations,[6] the band 31.8-33.4 GHz is allocated to the radionavigation service on a primary basis throughout the world. In addition, the band 31.8-32.3 GHz is allocated to the space research service[7] (deep space) (space-to-Earth) on a primary basis throughout the world. The band 32-33 GHz is also allocated to the inter-satellite service[8] on a primary basis throughout the world. Furthermore, footnote S5.548 states that, in designing systems for the space research service (deep space) in the band 31.8-32.3 GHz, and for the inter-satellite and radionavigation services in the band 32-33 GHz, administrations are urged to take all necessary measures to prevent harmful interference between these services, while bearing in mind the safety aspects of the radionavigation service.[9]

3. In the United States, the band 31.8-33.4 GHz is shared spectrum[10] for use by both Federal and non-Federal Government licensees. The band 31.8-33.4 GHz is allocated to the radionavigation service[11] on a primary basis and has been added to the list of frequencies available to aircraft (air carrier and private) stations and radionavigation land (unspecified) stations under the rules for Aviation Services.[12] However, this allocation is currently unused by non-Federal Government licensees. In addition, the band 31.8-32.3 GHz is allocated to the space research service for space-to-Earth transmissions on a primary basis by footnote US262 and the use of this allocation is limited to deep space communications at Goldstone, California.[13] The band 32-33 GHz is also allocated to the inter-

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[6] *See* 47 C.F.R. § 2.104.

[7] The space research service is a radiocommunication service in which spacecraft or other objects in space are used for scientific or technological research purposes and the allocation at 31.8-32.3 GHz is restricted to space-to-Earth transmissions from deep space. *See* 47 C.F.R. §§ 2.1, 2.105(d)(4).

[8] The inter-satellite service is a radiocommunication service providing links between artificial satellites. At the 1992 World Administrative Radio Communications Conference, the definition for the inter-satellite service was amended by changing the phrase "artificial earth satellites" to "artificial satellites." *See* ITU *Radio Regulations*, Edition of 1998, Volume 1E, Article S1, S1.22. We are updating our definition in 47 C.F.R. § 2.1 to conform to this WARC-92 amendment.

[9] *See* Appendix, footnote S5.548. At WARC-95, former international footnote 893 was re-numbered as S5.548. Previously, at WARC-92, the footnote was amended to include reference to the space research service (deep space) at 31.8-32.3 GHz.

[10] In the United States, radio spectrum may be allocated to either Federal Government or non-Federal Government use exclusively, or for shared use. In the case of shared use, the type of service(s) permitted need not be the same (*e.g.*, Federal Government FIXED, non-Federal Government MOBILE). *See* 47 C.F.R. § 2.105(b).

[11] Ground-based radionavigation aids are not permitted in the band 31.8-33.4 GHz, except where they operate in cooperation with airborne or shipborne radionavigation devices. *See* 47 C.F.R. § 2.106, footnote US69.

[12] *See* 47 C.F.R. § 87.173(b).

[13] Our rules also urge applicants for airborne or space station assignments in the band 31.8-32 GHz to take all practicable steps to protect radio astronomy observations in the adjacent band 31.3-31.8 GHz from harmful interference. *See* C.F.R. § 2.106, footnote US211. However, the radio astronomy service is protected from extraband radiation only to the extent that such radiation exceeds the level which would be present if the offending station were operating in compliance with the technical standards or criteria applicable to the service in which it operates. *See* C.F.R. § 2.106, footnote US74.

satellite service on a primary basis.[14] Footnote S5.548, as discussed in paragraph 2, also applies domestically.

4. We note that there is currently one pending application to use the band 32-33 GHz for inter-satellite links,[15] and we expect that sharing of the sub-band 32.0-32.3 GHz may require detailed coordination between the space research and inter-satellite services.

5. On October 28, 1998, we adopted a *Notice* in this proceeding.[16] We received one comment in response to the *Notice*. The Table, below, summarizes the existing allocations in this frequency range and our proposals for it.

Table: Existing Allocations in the Band 31.8-33.4 GHz and Our Proposal

Sub-bands	31.8-32 GHz	32-32.3 GHz	32.3-33 GHz	33-33.4 GHz
Existing Allocations (available to both Federal and non-Federal Government licensees)	Radionavigation service (ground-based radionavigation aids are not permitted except where they operate in cooperation with airborne or shipborne radionavigation devices)			
	Space research service (limited to the reception of signals from deep space at Goldstone, California)			
		Inter-satellite links (requested by a V-band applicant)		
NPRM Proposal	Delete unused non-Federal Government radionavigation service from 31.8-32.3 GHz.		Maintain the non-Federal Government radionavigation service allocation in the band 32.3-33.4 GHz.	

6. On December 16, 1999, our Office of Engineering and Technology and Office of Managing Director amended Part 2 of the Commission's Rules to make non-substantive revisions to the Table of Frequency Allocations.[17] The staff updated the International Table to reflect the Table of Frequency Allocations as it is found in the 1998 International Telecommunication Union ("ITU") *Radio Regulations*[18] and corrected the Federal and Non-Federal Government Tables by adding missing footnote references 893 (re-numbered as S5.548), US69, US262, and US278 to the band 32-33 GHz. These

[14] In the band 32-33 GHz, non-geostationary inter-satellite links may operate on a secondary basis to geostationary inter-satellite links. *See* 47 C.F.R. § 2.106, footnote US278.

[15] *See* PanAmSat Corporation's application for its V Stream System, File Nos. 162 through 172-SAT-P/LA-97.

[16] *See Amendment of Parts 2 and 87 of the Commission's Rules Regarding the Radionavigation Service at 31.8-32.3 GHz*, ET Docket No. 98-197, *Notice of Proposed Rule Making*, FCC 98-289, 63 FR 65726 (11/30/98), 13 FCC Rcd 22556 (1998) ("*Notice*").

[17] *See Amendment of Part 2 of the Commission's Rules to Make Non-Substantive Revisions to the Table of Frequency Allocations, Memorandum Opinion and Order*, DA 99-2743, 65 FR 4636 (1/31/2000), 15 FCC Rcd 3459 (2000).

[18] *See* ITU *Radio Regulations*, Edition of 1998. This revision of the *Radio Regulations*, complementing the Constitution and the Convention of the ITU (Geneva, 1992), incorporates the decisions of WRC-95 and WRC-97.

revisions to the Table of Frequency Allocations had been proposed in the *Notice*.[19]

III. DISCUSSION

7. As discussed in the *Notice*, the NTIA, at the request of the National Aeronautics and Space Administration ("NASA"), asked that we delete the radionavigation service allocation from the sub-band 31.8-32.3 GHz in the Non-Federal Government Table of Frequency Allocations.[20] NASA based its request on the potential for interference to its deep space receive site at Goldstone, California, from uncoordinated commercial radionavigation usage of 31.8-32.3 GHz. In support of its request, NASA cited ITU Recommendation ITU-R SA.1061 as documenting that space research (deep space) sharing with airborne operations in the radionavigation service is not feasible. NASA explained that signals received on Earth from spacecraft in deep space are extremely weak, and thus are highly susceptible to interference of all kinds. Further, NASA stressed that airborne interference sources, if present, would easily overwhelm the desired but weak signals from space. NASA pointed out that to bolster reception of signals from deep space it has fitted its large earth station antennas with cryogenically-cooled preamplifiers and has employed specialized receivers. NASA stated that it has sited the earth stations in such a way as to provide radio shielding from terrestrial radio sources sharing the same frequency band, which are potential interferers. But, NASA stated, its earth stations can not be shielded from airborne radio sources operating on frequencies within the sub-band 31.8-32.3 GHz, because the potential interfering signals may emanate from the same general direction as the desired deep space signals.

8. NASA indicated that currently, the only radionavigation operations in the sub-band 31.8-32.3 GHz are from Federal Government (military) operations.[21] The coordination of these military operations with NASA/Goldstone has been successful, NASA said, largely because they occur infrequently. By contrast, NASA does not believe that deep space operations can be coordinated successfully with private or commercial aircraft using terrain-following or landing-aid radars operating on an unrestricted basis within line-of-sight of the Deep Space Network site at Goldstone. To avoid causing interference, NASA stated, such aircraft would have to choose between the impractical solutions of either avoiding the airspace in the vicinity of Goldstone or turning off their transmitters while within line-of-sight of Goldstone.

9. NASA brought this issue before NTIA's Interdepartment Radio Advisory Committee ("IRAC").[22] During these discussions, the Federal Aviation Administration indicated that there are no known plans for commercial aeronautical radionavigation operations in the sub-band 31.8-32.3 GHz.

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[19] In the *Notice*, we observed that the references to footnotes US69, US262, US278, and 893 in the U.S. Table of Frequency Allocations, 47 C.F.R. § 2.106 (1997 Edition), for the band 32-33 GHz were missing. A review of our docket history files revealed that these footnotes were adopted in 1984. *See Amendment of Part 2 of the Commission's Rules Regarding Implementation of the Final Acts of the World Administrative Radio Conference, Geneva, 1979*, General Docket No. 80-739, *Second Report and Order*, 49 FR 2357 (January 19, 1984) at page C-149.

[20] *See* note 16, *supra*, at ¶¶ 4-6.

[21] *Id.* Military airborne precision ground mapping radars operate in the band 31.8-32 GHz. The Navy operates an automatic aircraft carrier landing system in the band 32-32.3 GHz.

[22] *Id.* The IRAC is composed of representatives appointed by twenty-three member Federal departments and agencies. Liaison between the IRAC and the FCC is effected by a representative appointed by the Commission to serve in that capacity. The IRAC serves in an advisory capacity pertaining to the allocation, management, and use of the radio spectrum. The IRAC advises the Assistant Secretary for Communications and Information, U.S. Department of Commerce, and reports to the Deputy Associate Administrator, Office of Spectrum Management.

After considering several options, the IRAC recommended to the NTIA that the radionavigation service allocations in the sub-band 31.8-32.3 GHz be limited to Federal Government use only, *i.e.*, that the unused non-Federal Government radionavigation service allocation be deleted from the sub-band 31.8-32.3 GHz. The NTIA endorsed this recommendation, concluding that future demand for commercial or private radionavigation services could be adequately accommodated in the remaining 1.1 gigahertz of radionavigation spectrum at 32.3-33.4 GHz.

10. The only commenter to this proceeding, Mr. Lyman C. Welch, commended the Commission for its proposal to protect deep space radio reception from harmful interference.[23] Mr. Welch noticed, however, that footnote reference US262 had been dropped from Non-Federal Government Table. Thus, commercial use of the Federal Government's Goldstone facility could no longer be authorized. Mr. Welch requests that the band 31.8-32.3 GHz remain available for future commercial space research purposes. Mr. Welch believes this is keeping in the spirit of the Commercial Space Act of 1998 and other congressional efforts that aim to ensure the success of commercial space development.[24] Mr. Welch states that "several commercial ventures are now planning and developing space vehicles, including asteroid probes and other deep space projects which may require use of the 31.8-32.3 GHz band to send radio communications from space. Such non-[Federal] Government commercial space users cannot rely on the remaining 32.3-33.4 GHz band since they would face the same interference problems now raised by NASA."

11. NASA confirms that commercial ventures have already come to the Jet Propulsion Laboratory for access to the Goldstone deep space network.[25] Accordingly, in order to preserve the authority for commercial entities to make use of the Federal Government's deep space facility at Goldstone, California, we will maintain the non-Federal Government space research service allocation in the band 31.8-32.3 GHz, limited to the reception of deep space communications at Goldstone, California. In doing so, we will display the non-Federal Government space research allocation in the same manner as we proposed for the Federal Government space research allocation. The footnote allocation will be moved up into the Table, and the text of footnote US262 will be revised to contain only the Goldstone, California site limitation.

12. Accordingly, we adopt our proposal to delete the non-Federal Government radionavigation service allocation from the sub-band 31.8-32.3 GHz. This action reduces the amount of spectrum available to the non-Federal Government radionavigation service in this frequency range by approximately 30%. By limiting future non-Federal Government radionavigation services to the sub-band 32.3-33.4 GHz, NASA's deep space operations in the band 31.8-32.3 GHz will be protected and sufficient spectrum will be available to accommodate such commercial and private radionavigation services as may develop in the future. As a consequence of this action, we also will delete the sub-band

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[23] *See* Comment of Mr. Lyman C. Welch, received December 15, 1998.

[24] The Commercial Space Act of 1998, 42 U.S.C.A. §14701 *et. seq.*, has encouraged both the collection of space science data and earth science data from commercial providers where cost effective. The policy behind the legislation is based on the premise that expanding commercial space activities will generate economic benefits for the Nation and provide the Federal Government with an increasing range of goods and services. *See* National Space Policy Fact Sheet, issued September 19, 1996, at ¶ 1 of the Commercial Space Guidelines (http://spacescience.nasa.gov/pubs/spacepol.htm).

[25] *See* e-mail from Wayne Whyte, NASA Spectrum Program Manager, dated September 15, 1999. Mr. Whyte also states that "the realities of deep space communications is that you require very large, very low noise earth stations such as at Goldstone. The likelihood of the commercial sector being able to independently develop a station to support deep space mission is highly remote due to the costs involved."

31.8-32.3 GHz from the list of frequencies that are available for use by the aeronautical radionavigation service under Section 87.173 of the rules for the Aviation Services.[26] Since the sub-band 32.3-33.4 GHz has previously been added to the Section 87.173, we are adding a rule part cross-reference to Part 87 in the Table of Frequency Allocations.

IV. PROCEDURAL INFORMATION

13. *Final Regulatory Flexibility Certification.* The Regulatory Flexibility Act ("RFA")[27] requires that a regulatory flexibility analysis be prepared for notice-and-comment rulemaking proceedings, unless the agency certifies that "the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities." The RFA generally defines "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction." In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act. A small business concern is one which: (1) independently owned and operated; 2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration ("SBA").

14. In the *Notice*, we concluded that the proposed rules "[would] not have a significant economic impact on a substantial number of small entities."[28] Although no separate comments were received concerning this certification, the only commenter to the proceeding, Mr. Lyman C. Welch, did express concern that this rule change would prohibit commercial use. In this *Report and Order*, we have clarified that commercial entities may continue to make use of the Federal Government's facility at Goldstone, and we therefore find that no small entities will be impacted by the rule change. Accordingly, we hereby certify that the deletion of the non-Federal Government radionavigation allocation at 31.8-32.3 GHz will not have a significant economic impact on a substantial number of small entities.

15. The Commission will send a copy of this *Report and Order*, including this final certification, in a report to Congress pursuant to the Small Business Regulatory Enforcement Fairness Act of 1996, *see* 5 U.S.C. § 801(a)(1)(A). In addition, the *Report and Order* and this certification will be sent to the Chief Counsel for Advocacy of the Small Business Administration, and will be published in the Federal Register. *See* 5 U.S.C. § 605(b).

16. *Authority.* This action is taken pursuant to Sections 4(i), 7(a), 303(c), 303(f), 303(g), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 157(a), 303(c), 303(f), 303(g), and 303(r).

V. ORDERING CLAUSES

17. Accordingly, IT IS ORDERED that pursuant to the authority contained in Sections 4(i), 7(a), 303(c), 303(f), 303(g), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 157(a), 303(c), 303(f), 303(g), and 303(r), this *Report and Order* IS ADOPTED and that Parts 2 and 87 of the Commission's Rules ARE AMENDED, as set forth in the Appendix, effective thirty days

[26] 47 C.F.R. § 87.173(b). Currently, this aeronautical radionavigation band extends from 31.8 GHz to 33.4 GHz.

[27] 5 U.S.C. § 601 *et. seq.* The RFA has been amended by the Contract With America Advancement Act of 1996, Pub. L. No. 104-121, 110 Stat. 847 (1996) ("CWAAA"). Title II of the CWAAA is the Small Business Regulatory Enforcement Fairness Act of 1996 ("SBREFA").

[28] *See Notice* at 9.

after publication in the Federal Register.

18. IT IS FURTHER ORDERED that the Commission's Consumer Information Bureau, Reference Information Center, SHALL SEND a copy of this *Report and Order*, including the Final Regulatory Flexibility Certification, to the Chief Counsel for Advocacy of the Small Business Association.

FEDERAL COMMUNICATIONS COMMISSION

Magalie Roman Salas
Secretary

Appendix: Final Rules

Parts 2 and 87 of title 47 of the Code of Federal Regulations are amended as follows:

PART 2 -- FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

1. The authority citation for Part 2 continues to read as follows:

AUTHORITY: 47 U.S.C. Sections 154, 302a, 303, and 336, unless otherwise noted.

2. Section 2.1(c) is amended by revising the definition for the inter-satellite service.

§ 2.1 Terms and definitions.

* * * * *

(c) * * *

Inter-Satellite Service. A radiocommunication service providing links between artificial satellites. (RR)

* * *

3. Section 2.106 is amended as follows:

a. Pages 74 and 75 of the Table of Frequency Allocations are revised.

b. Footnote US262 is revised.

The revisions read as follows:

§ 2.106 Table of Frequency Allocations.

* * * * *

30-31 FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) Standard frequency and time signal-satellite (space-to-Earth) S5.542			30-31 FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) Standard frequency and time signal-satellite (space-to-Earth) G117	30-31 Standard frequency and time signal-satellite (space-to-Earth)	
31-31.3 FIXED MOBILE Standard frequency and time signal-satellite (space-to-Earth) Space research S5.544 S5.545 S5.149			31-31.3 Standard frequency and time signal-satellite (space-to-Earth) S5.149 US211	31-31.3 FIXED MOBILE Standard frequency and time signal-satellite (space-to-Earth) S5.149 US211	Fixed Microwave (101)
31.3-31.5 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) S5.340			31.3-31.8 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive)		
31.5-31.8 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) Fixed Mobile except aeronautical mobile S5.149 S5.546	31.5-31.8 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) S5.340	31.5-31.8 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) Fixed Mobile except aeronautical mobile S5.149	US246		
31.8-32 FIXED S5.547A RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) S5.547 S5.547B S5.548			31.8-32 RADIONAVIGATION US69 SPACE RESEARCH (deep space) (space-to-Earth) US262 S5.548 US211	31.8-32 SPACE RESEARCH (deep space) (space-to-Earth) US262 S5.548 US211	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
32-32.3 FIXED S5.547A INTER-SATELLITE RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) S5.547 S5.547C S5.548			32-32.3 INTER-SATELLITE US278 RADIONAVIGATION US69 SPACE RESEARCH (deep space) (space-to-Earth) US262 S5.548	32-32.3 INTER-SATELLITE US278 SPACE RESEARCH (deep space) (space-to-Earth) US262 S5.548	
32.3-33 FIXED S5.547A INTER-SATELLITE RADIONAVIGATION S5.547 S5.547D S5.548			32.3-33 INTER-SATELLITE US278 RADIONAVIGATION US69 S5.548		Aviation (87)
33-33.4 FIXED S5.547A RADIONAVIGATION S5.547 S5.547E			33-33.4 RADIONAVIGATION US69		
33.4-34.2 RADIOLOCATION S5.549			33.4-36 RADIOLOCATION US110 G34	33.4-36 Radiolocation US110	Private Land Mobile (90)
34.2-34.7 RADIOLOCATION SPACE RESEARCH (deep space) (Earth-to-space) S5.549					
34.7-35.2 RADIOLOCATION Space research S5.550 S5.549					
35.2-35.5 METEOROLOGICAL AIDS RADIOLOCATION S5.549					

UNITED STATES (US) FOOTNOTES

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US262 The use of the band 31.8-32.3 GHz by the space research service (deep space) (space-to-Earth) is limited to Goldstone, California.

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PART 87 -- AVIATION SERVICES

4. The authority citation for Part 87 continues to read as follows:

AUTHORITY: 48 Stat. 1066, 1082, as amended; 47 U.S.C. 154, 303, 307(e) unless otherwise noted. Interpret or apply 48 Stat. 1064-1068, 1081-1105, as amended; 47 U.S.C. 151-156, 301-609.

5. Section 87.173(b) is amended by revising the last entry in the frequency table to read as follows:

§ 87.173 Frequencies.

* * *

(b) Frequency table.

Frequency or frequency band	Subpart	Class of station	Remarks
*	*	*	*
32300-33400 MHz.....	F, Q	MA, RL	Aeronautical radionavigation.